(12) UK Patent Application (19) GB (11) 2 230 445 (13) A

(43) Date of A publication 24.10.1990

(21) Application No 8903707.1

(22) Date of filing 17.02.1989

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(51) INT CL[5]
A01N 25/00

(52) UK CL (Edition K)
A5E ES E405
U1S S1304 S1306

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(58) Field of search
UK CL (Edition J) A5E EP ES
INT CL[4] A01N

(54) Package releasing its contents on contact with water

(57) A package, e.g. sachet, contains a liquid chemical or a chemical dissolved or dispersed in an organic liquid in an envelope adapted to release its contents on contact with water. The chemical may be a pesticide or herbicide and the envelope is made, e.g., from polyethylene oxide, methyl cellulose or polyvinyl alcohol.

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

Fig.1.

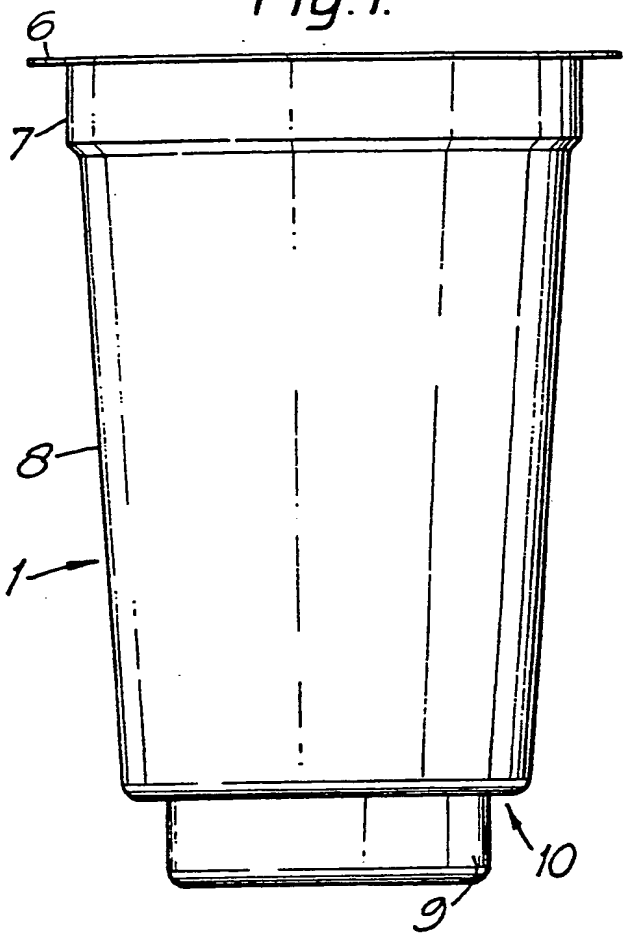


Fig.3.

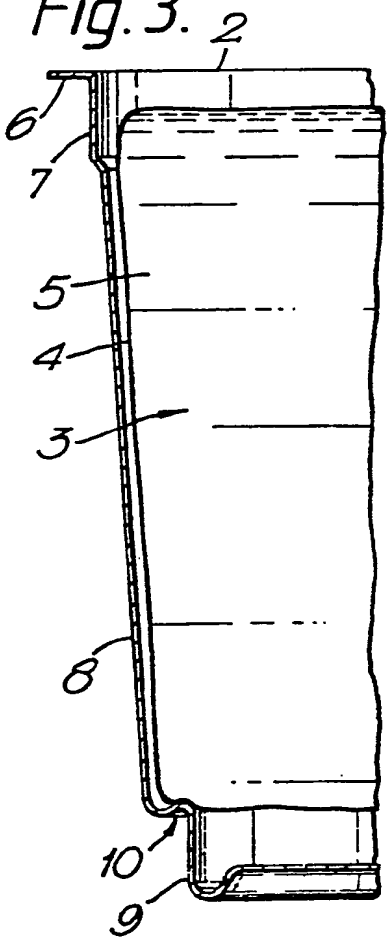
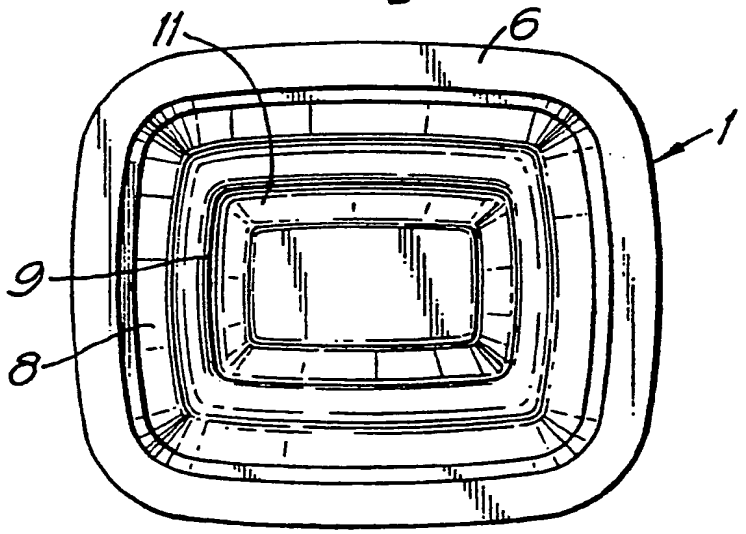


Fig.2.



NEW COMPOSITIONS OF MATTER

This invention relates to a package for a liquid chemical or a chemical dissolved or dispersed in an organic liquid, the package being adapted to release its contents on contact with water.

Chemicals such as pesticides and herbicides are often produced as a concentrated solution or dispersion in an organic liquid. Such chemicals are typically supplied in a metal or blow-moulded plastics container with a screw closure. To use the chemical a quantity of the concentrated material is measured out of the container and then mixed with a large volume of water before being sprayed onto plants. Such concentrated chemical solutions are usually highly toxic so great care must be taken in measuring and mixing them to avoid splashing the liquid chemical and to avoid human or animal contact with the concentrated solution or dispersion. As such chemicals are presently packaged it is easy to knock over a container during the mixing process resulting in the spillage of the contents with the resulting risk of contamination of the environment and risk of contact with humans and animals. Also, it is rare completely to finish the contents of the container and so it is common for farmers, and other users, to have partly full containers

left around. These represent a further hazard. Even when all of the contents have been used it is difficult to dispose of the empty container and adequately wash measuring instruments in which the concentrated solutions or dispersions are handled. Such devices represent a further hazard to personnel and to the environment.

The present invention provides a package containing a predetermined quantity of a chemical which is a liquid or which is dissolved or dispersed in an organic liquid contained in an envelope adapted to release its contents on contact with water.

The envelope, which preferably comprises a flexible wall, may be a sachet. Generally the material of the envelope wall is, or comprises, a water soluble or dispersible material which is insoluble in the organic liquid.

Such packaging avoids all of the above difficulties. To use the package an appropriate quantity of water is measured out into a container such as a sprayer tank and then the envelope, e.g. a sachet, is merely placed whole into the container with a predetermined measure of water and mixed. The contents of the envelope are released when, for example, the material from which a sachet is made dissolves or disperses throughout the water together with the chemical. Thus, there is no possibility of spilling the chemical liquid since it is still in the form of a closed

and sealed package when it is mixed with the large volume of water. During mixing any splashing that occurs is splashing only of a diluted chemical and this is naturally not so toxic to personnel or so damaging to the environment should any splashing or spillage occur.

The chemicals which may be packaged include pesticides and herbicides (for example hydroxybenzonitrile herbicides, e.g. bromoxynil) and, more generally, chemicals which are to be dissolved or dispersed in a large volume of water or aqueous liquid, such as compounds, e.g. metronidazole, used to combat spoilage in industrial aqueous liquids, or compounds for addition to the aqueous circuits of industrial or domestic heating systems, compounds for addition to swimming pools and photographic materials. The pesticides include, e.g. insecticides or molluscicides for addition to, for example, ponds or streams. Borates, chlorides and chlorates should not be present in the envelope contents.

Suitable water soluble or dispersible materials which are insoluble in the organic solvents used to dissolve or disperse the chemical are polyethylene oxide or methyl cellulose, but preferably the envelope, e.g. a sachet, comprises or is made from polyvinyl alcohol film, i.e. partially or fully alcoholysed polyvinyl acetate film. The polyvinyl alcohol film may be unoriented or mono-axially oriented but preferably it is bi-axially oriented. The polyvinyl alcohol material may be extruded as a tube and

then inflated to bi-axially orient it or it may be cast. The film is formed into a tube and the resulting tube is sealed and then filled with the predetermined quantity of the chemical. The tube is again sealed above the quantity of chemical to form a closed sachet. The tube is generally sealed by a heat sealing or solvent welding process: the integrity of the seal is of particular importance to ensure no leakage of the liquid contents.

In practice the envelopes according to the invention should release their contents in less than about 10 minutes. When the envelope is a sachet the thickness of the walls should be kept to a minimum, e.g. about 30 microns, although large sachets may require thicker walls. The thicker the wall, the longer dissolution or dispersion of the wall material will take. It will be understood that the envelopes according to the invention may comprise an area of wall which is more readily dissolved or dispersed than the rest to facilitate more rapid release of the contents of the envelope.

The organic liquid solvent may be a petroleum based solvent, an aliphatic or aromatic hydrocarbon or one of the higher alcohols (lower alcohols may migrate through the water soluble or water dispersible materials described above: this can result in product appearing on the outside of the envelope.). Mixtures of a hydrocarbon solvent with another solvent, e.g. a ketone or a higher alcohol, may also be used. The organic liquid must be reasonably dry and

typically contains less than 2 to 3% of water to ensure that it does not leak prematurely from the envelope.

The liquid contents of the envelope may be thickened or rendered thixotropic. An increased viscosity in the contents can reduce the likelihood of the envelope being ruptured if the package is subjected to mechanical shock, particularly if the envelope comprises a flexible wall. The contents of the envelope may be rendered more viscous or thixotropic by the inclusion of additives, for example, modified, organophilic, bentonite, lecithin, polymethylene oxide or silica gel.

The concentrations of pesticide or herbicide dissolved or dispersed in the organic liquid will generally be those conventionally used: in order to reduce the bulk of each envelope, however, concentrations may be increased. Each envelope will preferably contain at least about 500 ml and will preferably contain a convenient standard volume, for example 500 ml or 1 litre.

Preferably the filled envelope is packaged in an outer waterproof container which both protects the envelope from water and premature dissolution and also acts as a second barrier between the concentrated and potentially toxic solution or dispersion of chemical and personnel handling the container and the environment. The outer container may have the form of a container formed of plastics material with a reclosable and resealable lid containing two or more of the envelopes. Preferably however

each envelope is individually packed in a separate outer container. In this case preferably the outer container is formed of thermoplastics material which is injection molded or blow-moulded to form a container having a top, substantially flat flange, a side wall and a base. The filled envelope is placed inside the container and then a foil lid is sealed onto the top of the substantially flat flange to provide a completely closed and sealed outer container. The lid is typically made of aluminium foil and heat sealed onto the top flange of the container but it may also be made of a plastics foil or a laminate of paper, plastics and/or aluminium.

Preferably the outside of the container is printed with information concerning the contents of the envelope, instructions for use, and any warnings concerning the nature and toxicity of the chemical. This information may be carried on the foil lid or on a label attached to the side wall of the outer container.

The packaging in accordance with the preferred aspects of this invention provides a tough, two stage packaging which provides for the safe transport of concentrated chemicals and allows handling of potentially toxic chemicals with the minimum risk to personnel and the environment.

A particular example of a package in accordance with this invention will now be described by reference to the accompanying drawings, in which:-

Figure 1 is a side elevation of the complete package;

Figure 2 is an underplan of the outer container; and

Figure 3 is a longitudinal radial section through the complete package.

The package comprises an outer container 1 having a foil lid 2 surrounding and enclosing a sachet 3. The sachet 3 is made of cold water soluble grade bi-axially oriented polyvinyl alcohol film 4 made from 88% alcoholysed polyvinyl acetate having a wall thickness of 30 microns which is heat-sealed into the form of a sachet containing 500 millilitres of a concentrated dispersion of a chemical in an organic liquid. The sachet 3 is housed inside the container 1 which includes a substantially flat top flange 6 connected by upper collar portion 7 to a tapering side wall 8. The container 1 also includes a foot 9 which is joined to the lowest end of the side wall 8 by a shock absorbing section 10. The container has a generally rectangular shaped cross-section with rounded corners between adjacent sides and with generally bowed faces as shown most clearly in Figure 2. The container 1 is injection moulded from a block polymer polypropylene having a high melt flow index and typically having a constant wall thickness throughout of, for example, substantially one millimetre.

The shock absorbing section 10 is corrugated and generally S-shaped in cross-section as shown in Figure 3.

The corrugated generally transverse section 10 which joins the lower edge of the side wall 8 to the upper edge of the foot 9 is capable of flexing as a result of the natural resilience of the thermo-plastics material to allow some relative upwards and downwards movement to occur between the foot 9 and the side wall 8 which absorbs shock loads applied to the container 1 if it is inadvertently dropped, for example, during transport and handling.

The sachet 3 is held inside the container 1 by the aluminium foil lid 2 which is heat-sealed onto the flange 6 of the container 1 or which may alternatively be connected by an adhesive. The outer container 1 and lid 2 provide protection for the sachet 3 and so protect it from contact with water and hence its premature dissolution. It also provides an additional barrier layer around the concentrated dispersion of chemical 5 inside the sachet 3 to provide an additional barrier in case of rupture of the sachet 3 which prevents the potentially harmful chemical 5 in the sachet from contact with personnel or the environment. However, to use the concentrated dispersion of chemical material, the foil lid 2 is simply removed and then the sachet, still sealed, is dropped into a sprayer tank containing a predetermined amount of water. The material 4 of the sachet dissolves rapidly in the water so allowing the contents 5 to be dispersed throughout the water in the sprayer tank on mixing. The outer container 1 is not contaminated with the concentrated chemical and can thus be disposed of without taking any special precautions and the personnel dealing with the concentrated chemical never come into contact with it, so reducing the hazards and risks involved in handling such potentially harmful materials.

CLAIMS

1. A package containing a predetermined quantity of a chemical which is a liquid or which is dissolved or dispersed in an organic liquid contained in an envelope adapted to release its contents on contact with water.

2. A package according to claim 1 in which the envelope comprises a flexible wall.

3. A package according to claim 1 or 2 in the form of a sachet.

4. A package according to claim 1, 2 or 3 in which the material of the envelope is, or comprises, a water soluble or dispersible material which is insoluble in the organic liquid.

5. A package according to any one of the preceding claims in which the material of the envelope is polyethylene oxide or methyl cellulose.

6. A package according to any one of the claims 1 to 4 in which the material of the envelope is polyvinyl alcohol.

7. A package according to any one of the preceding claims in which the contents are released in less than about 10 minutes after contact with water.

8. A package according to any one of the preceding claims which comprises at least about 500 ml of contents.

9. A package according to any one of the preceding claims in which the organic solvent is a hydrocarbon solvent or a higher alcohol.

10. A package according to any one of the preceding claims in which the liquid contents of the envelope comprise additives to increase the viscosity.

11. A package according to claim 10 in which the liquid contents comprise modified, organophilic, bentonite, lecithin, polymethylene oxide or silica gel to increase the viscosity.

12. A package according to any one of the preceding claims in which the chemical is a hydroxybenzonitrile herbicide.

13. A package according to claim 1 substantially as hereinbefore described with especial reference to Figure 3.

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